Uroview Subsystem

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Circuit/Mechanical Descriptions

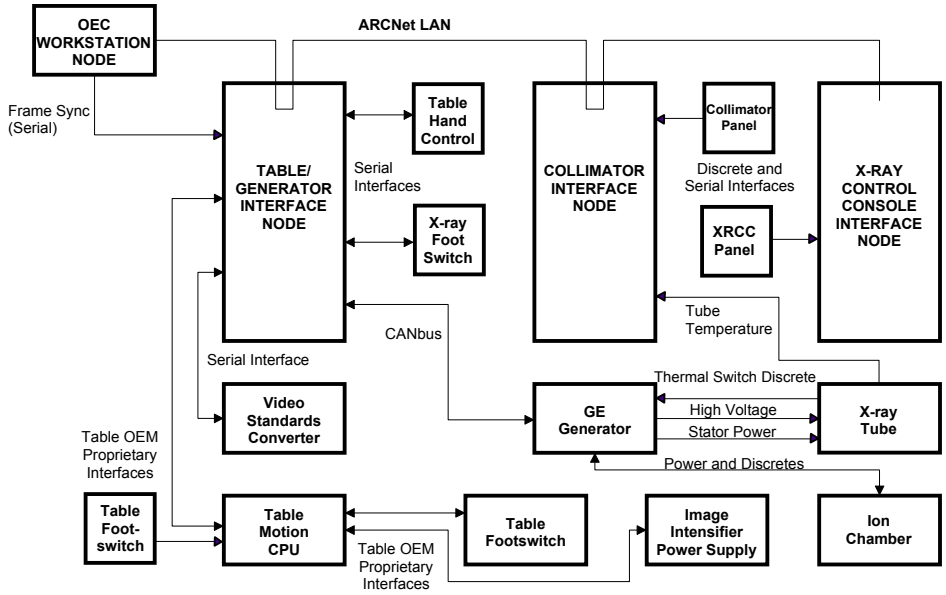
The following paragraphs describe basic electrical and physical features of the Uroview 2800 Subsystem. Subsequent chapters in this manual provide additional details about individual subsystem components. You can obtain system-level information by using this manual in conjunction with the following references:

- 2800 Interconnect Diagram (GE OEC P/N 00-881504)
- UroView 2800 Operator's Manual (GE OEC P/N 00-882490-01
- OEC WorkStation Service Manual (GE OEC P/N 00-879063)
- OEC WorkStation Operator's Manual (GE OEC P/N 00-880860)

Subsystem Equipment

The Uroview 2800 Subsystem consists of a the following:

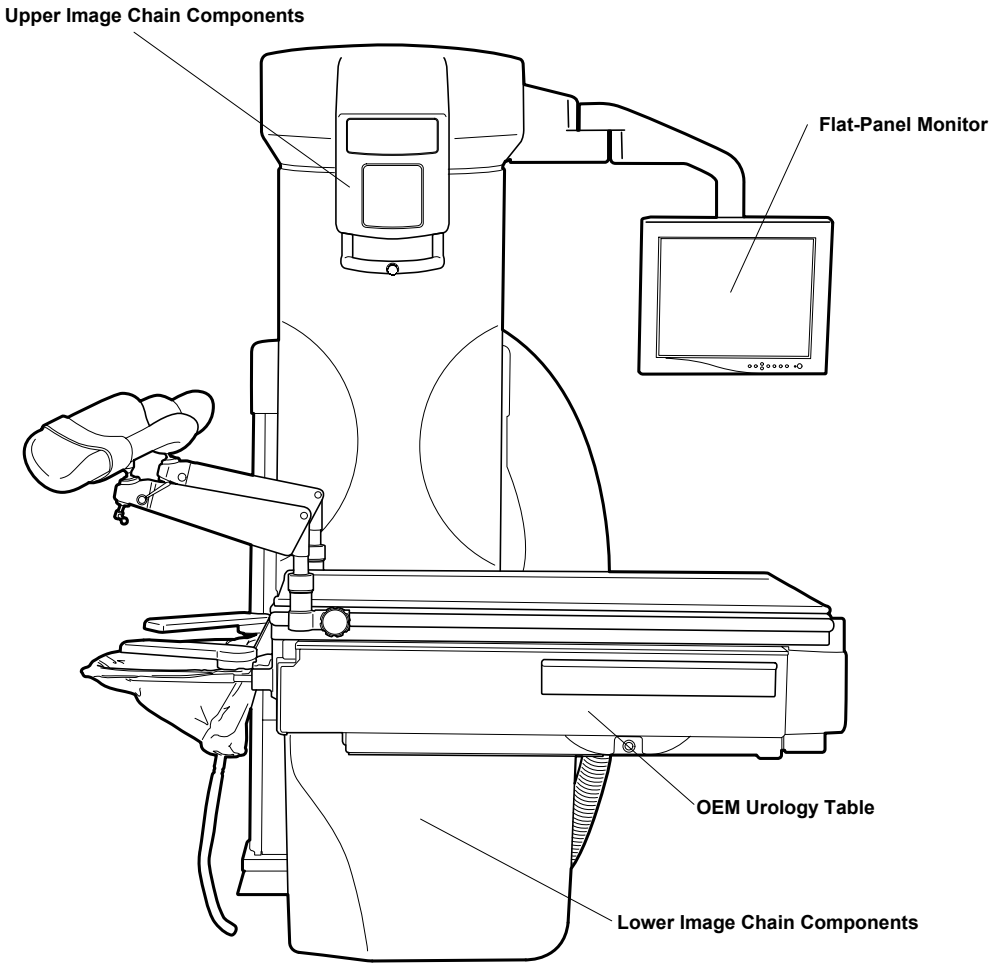
- **An ARCNet LAN** that accepts commands from and provides data to a GE OEC 1k x 1k WorkStation, which provides overall control of the Uroview 2800 Subsystem. The simplified block diagram below shows the ARCNet LAN along with most major communication and control circuits.



Uroview Subsystem ARCNet LAN

Besides the WorkStation node, the ARCNet LAN also includes an ARCNet node controller for the Table/Generator Interface, another ARCNet controller for the Collimator Interface PCB, and a third ARCNet controller for the X-ray Control Console Interface. A single-board computer associated with each of the three ARCNet nodes manages local node activities, communicating with individual devices in the node through serial lines or through discrete signals, and communicating with the node controller over the ISA bus. The Table/Generator Interface is the most complex of the three node controllers, providing Generator control and monitoring over a dedicated CANbus.

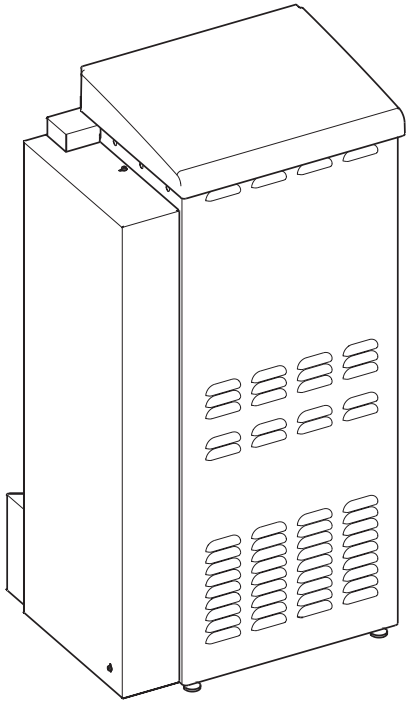
Except for WorkStation LAN circuitry, the ARCNet LAN resides inside the Table/Tower assembly shown below. Additional information about the ARCNet LAN and associated circuitry is available in the Communications chapter of this manual.



Uroview SubsystemTable/Tower Assembly

- **A motorized, full-featured OEM Urology Table** (shown above) with standard accessories and operator controls. The table provides precisely controlled movement, including lateral, longitudinal, vertical motion, and tilt positioning. The Table includes position sensors that enable monitoring of current Table position parameters, make table position adjustments based on these parameters and operator inputs, and report current table position information to the operator on two vacuum fluorescent displays (VFDs). Detailed information about table movement functions is available in the Table Motion chapter of this manual.
- **A GE OEC Image Chain** (also shown above) consisting of a Collimator, Image Intensifier, and CCD Camera. The Image Chain includes standard accessories and all operator controls necessary to produce fluoroscopic and film X-ray images. The Image Chain also includes a Film Cassette with automatic features that monitor the condition and control the position of the Film Cassette. The Image Chain mounts in the movable Tower Assembly that is co-located with the Urology Table (see above illustration). Detailed information about the Image Chain is available in the Camera/Video, Image Intensifier Control, Collimator Control, and Film chapters of this manual.
- **A Video Standards Converter and Flat-Panel Display** located inside and attached to the Table/Tower Assembly. The Video Standards converter (VSC) accepts high-resolution video from the WorkStation along with video from other imaging sources such as Storz or Urodynamics equipment. The VSC converts all video inputs to SXGA format (1280 x 1024 pixels) for optimum display on the Flat Panel Display. The VSC and associated modules together provide the processing and standards conversion necessary for the Flat Panel Display to show multiple-source video using a Picture-in-Picture mode, and switch between two image sources using the Video Shift feature. The VSC and Flat Panel Monitor mount in the Table/Tower Assembly (see above illustration). Consult the Camera/Video chapter in this manual for more information on subsystem video capabilities.

A GE Medical Systems Generator. The basic Generator is a 40kW single-phase device. Optional generators include 65kW and 80kW three-phase models, each of which drives a dual-speed X-ray Tube stator. The Generator has no operator controls, and operates under the control of the Table/Generator Interface, which communicates with the Generator over the CANbus.



Uroview Generator

Functional Tests

Refer to the Uroview 2800 Operator's Manual (GE OEC P/N 00-882490-01) for System power-up instructions and information about the location and use of equipment controls and indicators.

The Bootup Test described next must successfully complete before you can perform more detailed subsystem fault isolation.

Boot Up Test

After you apply power to the Uroview 2800 System, software-driven system initialization occurs. This is a complex process that takes several seconds to complete. Distinctive icons appear across the top of the two subsystem VFDs as boot up executes. A total of 18 icons appears on each VFD when the system boots normally and is ready to operate. A blank icon at the conclusion of bootup usually indicates a software problem, as described in the table below.

System Initialization Icons

Note: First ten icons appear very quickly because associated tasks take very little time.

Note: If the system hangs during boot up, cycle power and try the boot up process again. If the problem persists, make a note of the number of icons present on the VFDs, any error messages you see on the VFD, and any other symptoms you observe. Then refer to the Diagnostics chapter for troubleshooting information.

Boot Up Icon Summary

# of Icons	Meaning	Probable Failure Point(s)
1	ARCNet initialization complete	Software; ARCnet initializes whether or not all nodes are present
2	Persistent objects loaded	Software
3	Timers initialized	Software
4	Table communication established	Software; ARCnet node on TGI PCB
5	Video Standards Converter communication established	Software; Serial interface between TGI Interface PCB and VSC
6	CANBus initialized	Software; Physical interface between TGI PCB and Generator
7	Starting generator initialization (multitasking initiated)	Software
8	All analysis software tasks have initialized	Software
9	Generator software objects created and related	Software
10	Error handler initialized	Software
11	Camera ready	Software; Power or camera hardware
12	System events loaded from persistent memory	Software

# of Icons	Meaning	Probable Failure Point(s)
13	PIO initialization complete	Software
14	Bridges initialized	Software
15	Generator software initialization complete	Software
16	ABS Tables loaded	Software
17	HI Panel unlocked	Software
18	X-rays enabled	Software; Interlocks circuitry

How to Use This Manual

This functionally oriented service manual describes how to test and troubleshoot equipment groups within the Uroview Subsystem. Each section of the manual contains circuit/mechanical descriptions, troubleshooting information, and calibration/adjustment instructions. The manual is organized as follows:

Introduction/Safety

Read this section before you attempt to troubleshoot or repair the subsystem. It contains important safety information that will protect you from injury and help you to repair the Table/Tower without harming the equipment.

Uroview Subsystem

This section provides an overview of the entire Uroview Subsystem. It describes the major components and major functions of the subsystem, and describes how to the Uroview System boot up test executes.

Power Distribution

This section describes Uroview System power distribution, providing details on facility power requirements, transformer strapping, AC distribution within the system, and DC power distribution within the system.

Interlocks

The The Uroview 2800 has many software-based and hardware-based safety features that help prevent injury to patients and damage to the equipment. This section discusses the Interlocks circuitry, which is a primary safety feature that prevents X-ray generation when it is unsafe for the patient or unsafe for the equipment to do so.

Communication

This section provides a brief summary and block diagram of Subsystem communications. It provides details on ARCNet functions and the CAN Bus, and explains the other significant interfaces used in Subsystem communications.

X-ray and ABS

This section provides functional descriptions and other details on the X-ray generator. It covers such topics as rotor control and braking; kV generation, monitoring, and control; mA generation, monitoring, and control; and automatic brightness stabilization.

Film

The Film section describes how the system produces radiographic images on cut sheet film. It discusses topics such as film cassette position sensing, automatic exposure control, ion field selection, and optical density control.

Image Intensifier Control

This section describes the circuitry that changes the magnification of the image intensifier field size (also called “mag mode”) by adjusting external DC bias to the image intensifier tube.

Collimator Control

This section tells how the collimator operates mechanically and electrically. It provides details on control and feedback circuits, and describes how to troubleshoot problems associated with the collimator.

Camera Video Control

Refer to this section for information on video circuitry in the Uroview Subsystem. It describes the distribution and presentation of high resolution video from the CCD camera and video from alternate sources.

Table Motion

Refer to this section for detailed information on motorized or electrically assisted equipment movement. You will find information on elevation, lateral movement, and longitudinal movement of the table top. This section also provides information on lateral and longitudinal movement of the X-ray head.

Diagnostics

This section provides a wealth of information on how to use the service tools available to diagnose troubles associated with the Uroview System. It provides details on displayed error messages, table motion servicing software, the Remote Utilities Suite software, the table communication protocol, generator power-on diagnostics, and diagnostic LEDs that are available on several system printed circuit boards. This section also provides extensive information on how to access and interpret the system error log.

Calibration

Use this section to find instructions on how to perform major system calibrations. It provides information on how to assure the accuracy and repeatability of table motion, table position display, kV and mA generation, entrance exposure limiting, dose area product calculation, collimator movement, video standards converter setup, X-ray beam alignment, automatic exposure control, and Workstation monitor adjustment.

Replacement

Refer to this section for information on how to replace most major system assemblies. Each removal/replacement procedure includes illustrations and step-by-step instructions.